THE

HOLLY SYSTEM

OF

STEAM HEATING

FOR

CITIES AND VILLAGES,

THROUGH

PIPES LAID IN THE PUBLIC STREETS.

ANNOUNCEMENT

OF

The Holly Steam Combination Company

LIMITED,

OF LOCKPORT, N. Y.,

FOR SUPPLYING HEAT TO PRIVATE DWELLINGS AND PUBLIC BUILDINGS OF EVERY DESCRIPTION, FROM A CENTRAL POINT, THROUGH STREET MAINS AND LATERALS, AND TO MEASURE THE STEAM USED TO EACH CONSUMER.

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1878

PREFACE.

The wants of civilization are constantly expanding, and to supply these, ingenuity is continually taxed to invent new systems and appliances. Particularly is this so in closely settled communities. The family actually furnishes itself with but a small part of its daily wants. By a division of labor, the few minister to the wants of the many. Our clothing, many of our daily supplies, our lights, even the water we use, are furnished systematically, better and cheaper than we can supply them ourselves. One thing more was needed, viz.: a system of heat distribution.

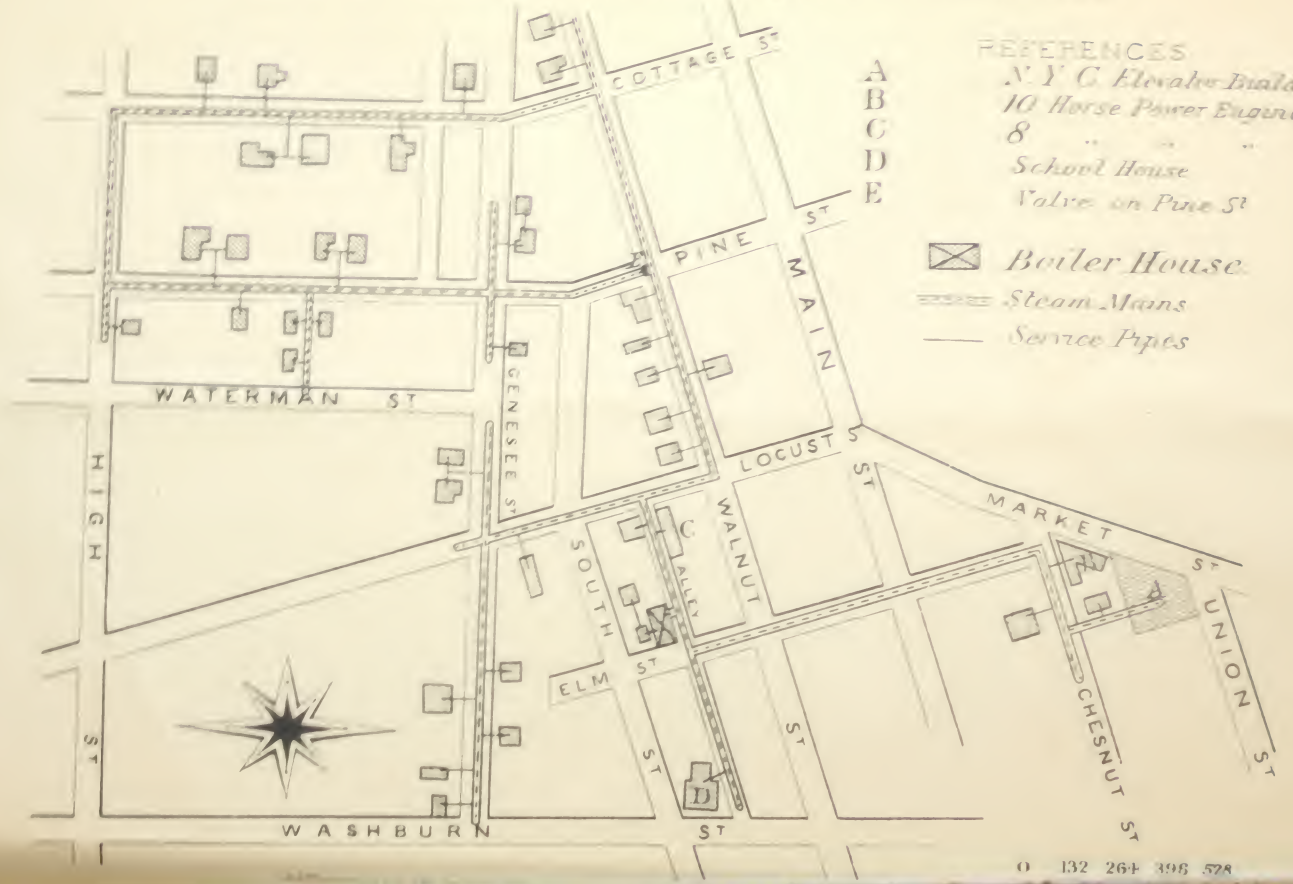
Mr. Birdsill Holly, through the agency of steam, is the first to solve this problem; and "The Holly Steam Combination Company, of Lockport, N. Y.," was formed to practically demonstrate the utility of his inventions.

Assured of complete success, after a winter of actual operation, we greet a long-suffering public, and in the following pages, set forth somewhat in detail, the measure of our success, and the methods of accomplishment.

The Plates here exhibited are designed to give the reader a general idea of the uses of the special parts of the system, without the burden of a minute mechanical description, which is reserved for engineers and persons directly interested in putting in the work.

ROCHESTER, N.Y.

Showing District now heated by "The Holly Steam Combination Co"



THE HOLLY SYSTEM

OF

STEAM HEATING

FOR CITIES AND VILLAGES.

WARMTH is the essential condition of life in the human body, and vitality ceases when warmth departs. Its proper distribution is necessary to our health and happiness. Climatic changes from day to day tend constantly to destroy the equilibrium of our comfort. Food supplies carbon, one of the elements of heat; clothing wards off the rude blast, and prevents too rapid radiation from our bodies. These are prime necessities, but they are not enough.

Through much of the year we still require artificial warmth in our homes. How to secure this warmth to a proper degree economically and to maintain pure the air that we breathe, has been the study of many minds and the subject of many inventions. The transition from the open fire-place of our fathers to modern appliances has been in the line of labor-saving and economy in fuel, but not in the direction of pure air and wholesome living. Stoves and furnaces, though serving a valuable purpose, are subject to grave objections. At best they are imperfect heaters. They pollute the air with dust. Deleterious gases escaping are stealthily commingled with the atmosphere which we breathe, and are the cause of not a few serious ailments.

STEAM HEATING

is doubtless the climax of all the adaptations thus far in supplying artificial heat. This agent, the world's mighty working power, which drags heavy trains across continents and drives the merchant ship across the ocean, can yet perform the more quiet but not less useful and effective

service of warming the homes of millions who dwell in cities and villages.

To quite an extent steam is already used in heating buildings. But the boiler and fixtures for single dwellings are very expensive, as is also the maintenance. Some years since, Mr. Birdsill Holly, a celebrated engineer, and the inventor of the Holly Water Works system, etc., etc., conceived the idea that steam could be supplied from a central point, not only for power but to heat large districts of dwellings, stores, and other buildings in cities and villages, the same as gas and water have been for a long time. Subsequently he put his ideas into an experimentally practical shape, which soon satisfied him that the plan was entirely feasible if properly worked out.

In January, 1877, the Holly Steam Combination Company, of Lockport, N. Y., was formed under the statute, with necessary capital to test the plan on a large scale. Three miles of underground pipe were laid, but little of it larger than four inches diameter, and after a series of exact tests and detailed practical experiments, and after the experience of a variable and peculiarly trying winter, the system is pronounced by all to be a practical and perfect success.

We exhibit herewith a plan *(see plate page 4.)* of the district now being heated, with the position of the mains, buildings, etc. The company has through the winter been heating about forty large dwellings, scattered along the line, also a large school building, 105,000 cubic feet, and the largest hall in the city, besides furnishing steam to run two engines, one of them nearly half a mile distant from the boiler-house, and are supplying steam for a number of other purposes.

Houses a mile away are heated as readily as those near at hand. Three boilers are in position, two of them horizontal, 5 by 16 feet, and one upright. In the coldest weather two were fired slowly, but much of the time the steam has been furnished by a single boiler. The fire is, of course, kept up constantly. Two firemen do all the work, one for the day and one for the night. They can do the same work for three hundred or four hundred dwellings, when that number is attached along the line. Careful experiments demonstrate the fact, that with sufficient boiler capacity, and pipes of proper size, an area of more than four miles square in any city or village can be warmed from one set of boilers. The arrangement of boilers by this system is deserving of special attention. Our building is intended to contain six boilers. *(See plate No. 2.)* The street main will have two connections with this

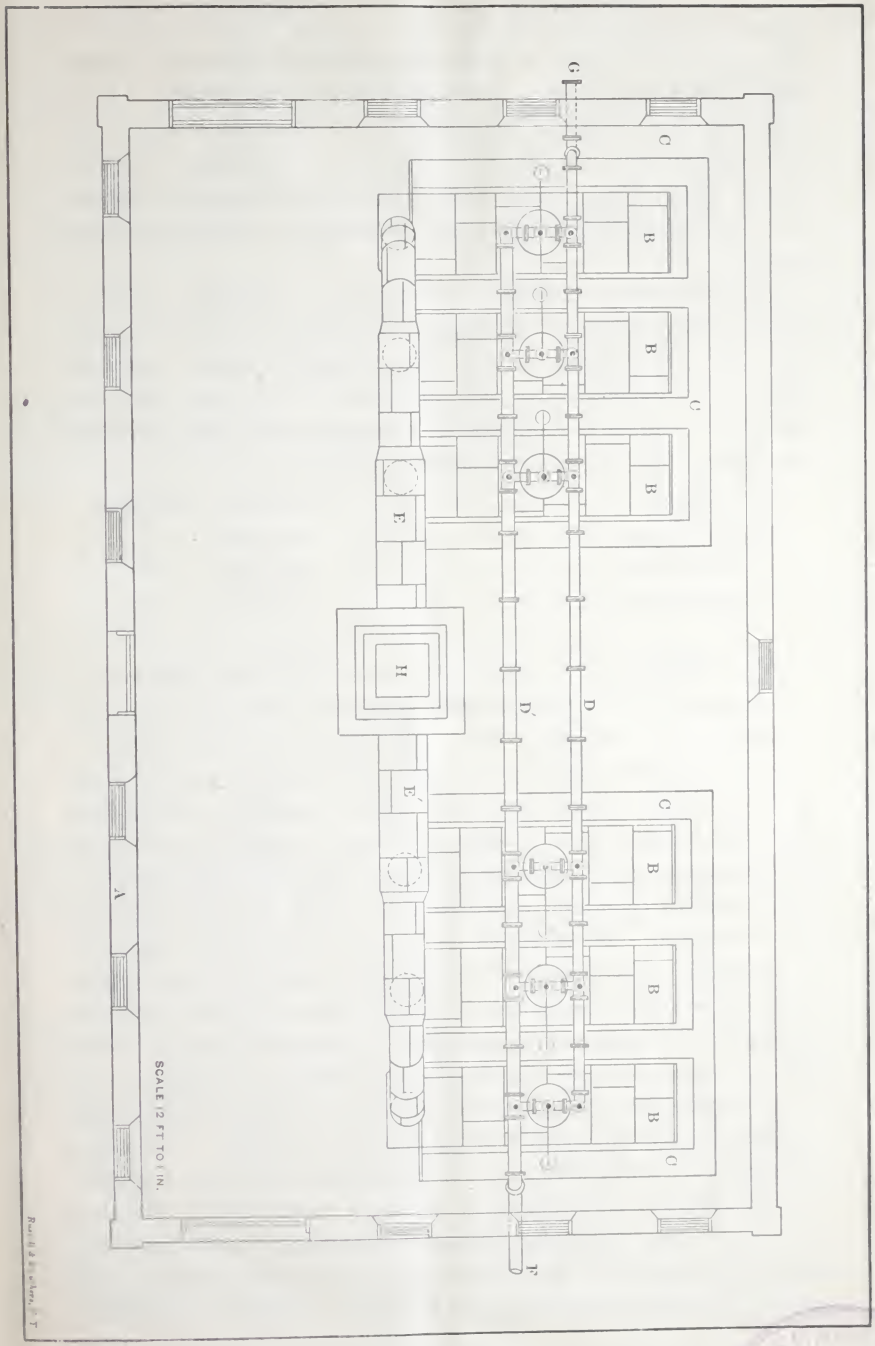


PLATE NO. 2.

train, one at each corner of the building on the north side. A larger building for a larger system, will contain an increased number. If one boiler from any cause is disabled, it will not interfere with the operations of the others. In the coldest weather, if necessary, the whole number can be fired. As the weather moderates, a part can be dropped out of service, or they can be used alternately to facilitate occasional cleaning.

We present also a drawing, *(see plate No. 3.)* showing a section of district designed to be heated in an imaginary city, with streets, dwellings, stores, factories, etc. In the plan submitted are 200 stores with offices, 200 dwellings, 9 churches, and about 20 factories. Estimating the cubical contents of the stores as averaging 50,000 cubic feet, dwellings 10,000, churches 200,000, factories 100,000, we have

200 Stores	10,000,000	cubic feet.
200 Dwellings	2,000,000	"
9 Churches	1,800,000	"
20 Factories	2,000,000	"
Total	15,800,000	cubic feet.

This space is to be warmed by one battery of ten boilers, each 5 feet diameter by 16 feet long. The boiler-house is at *A*, intersection of Niagara and Buffalo streets. Two eight inch mains lead from the house, one into Niagara street, connecting with an eight inch street main. The other connects with the eight inch main in Buffalo street, the two intersecting the main in Pine street, which is also eight inches, thus forming a circuit of eight inch pipe around the block in which the boiler-house is located. The arrangement is such that it will be impossible for the district to be deprived of steam at any time, for in case of accident, any one of the mains can be closed without interfering with the general circuit. Suppose it necessary to close the main on Buffalo street, between Pine and Niagara, the steam will leave the opposite end of the building and through Market street to Pine, and through Buffalo to Delaware, it will connect with all parts of the district. The mains throughout the entire district are divided into sections, each of which is so controlled by the arrangement of valves, that it can be closed, or shut off, in case of necessity, without inconvenience to the other sections; but as this is of rare occurrence, the precaution is simply a safeguard. By these arrangements and connections, any part of the district

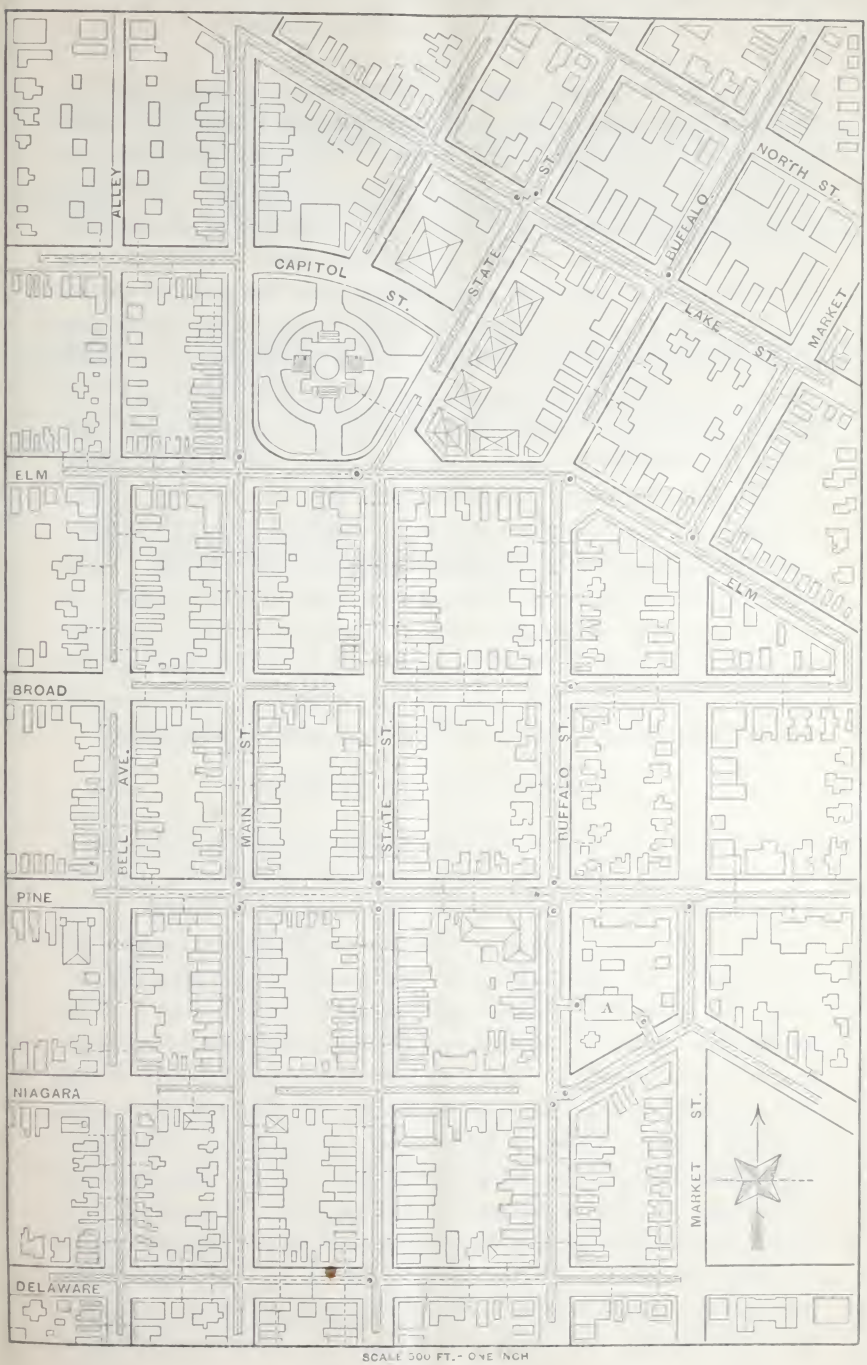

ALLEY
CAPITOL
ST.
STATE
ST.
BUFFALO
NORTH ST.
LAKE
ST.
MARKET
ELM
BROAD
PINE
NIAGARA
DELAWARE
BELL
AVE.
MAIN
ST.
STATE
ST.
BUFFALO ST.
MARKET ST.
A
SCALE 300 FT.= ONE INCH

PLATE NO. 3.

which may be for the time drawing a large amount of steam, may be reinforced from opposite directions, and thus the pressure be evenly maintained throughout the entire district. The pipes, as they radiate and approach the limits of the district, decrease in size from eight inches to one and one-half inches in diameter, to correspond with the amount of steam to be passed. It will be seen that much smaller and less expensive pipes are used than are necessary in the low-pressure system, which is used to advantage in single buildings, but could not be employed in an extended system of street mains. Under the low-pressure system in the pipes, the amount of steam which can be delivered is very limited. But by Mr. Holly's system of regulation, low-pressure, 4 lbs. or less, is secured in the building, while 60 lbs or more may be carried in the boilers and mains. It will readily be seen that with this amount of pressure, a small pipe will deliver an immense quantity of steam, while the conditions in the building are always uniform and safe. These mains are laid in ditches dug in the streets, three to four feet deep, so as to be above the gas and water pipes. The pipe is covered with non-conducting materials, and then inserted in logs of wood bored for the purpose. These are laid over tile to secure drainage. The drainage is also an improvement to the street after the ground becomes settled.

THE CONTRACTION AND EXPANSION

of the iron for conveying steam long distances, has been a real obstacle to successful operations. In this system, an expansion junction service box is placed at intervals of 100 to 200 feet in the line. *(See plate No. 4.)* This provides for the free longitudinal expansion and contraction of the mains, and from this box the service pipes are carried under ground to the basement of buildings to be heated. The service pipes having an adjustable hood inside the junction box, may be turned downward, thus taking up the water of condensation as fast as it accumulates, and carrying it forward to the regulator valve inside the cellar walls, as shown in plate No. 5. At this point, the water of condensation being at the degree of heat due to 50 lbs. pressure to the square inch,—is wire-drawn, and by this reduction of pressure, it is largely re-converted into steam, and is carried on to the radiators, where it is again condensed. By this device it will be seen that although 50 lbs. pressure is carried in the mains, it may be reduced to one or two lbs. in the building, and therefore in a house two or three miles distant

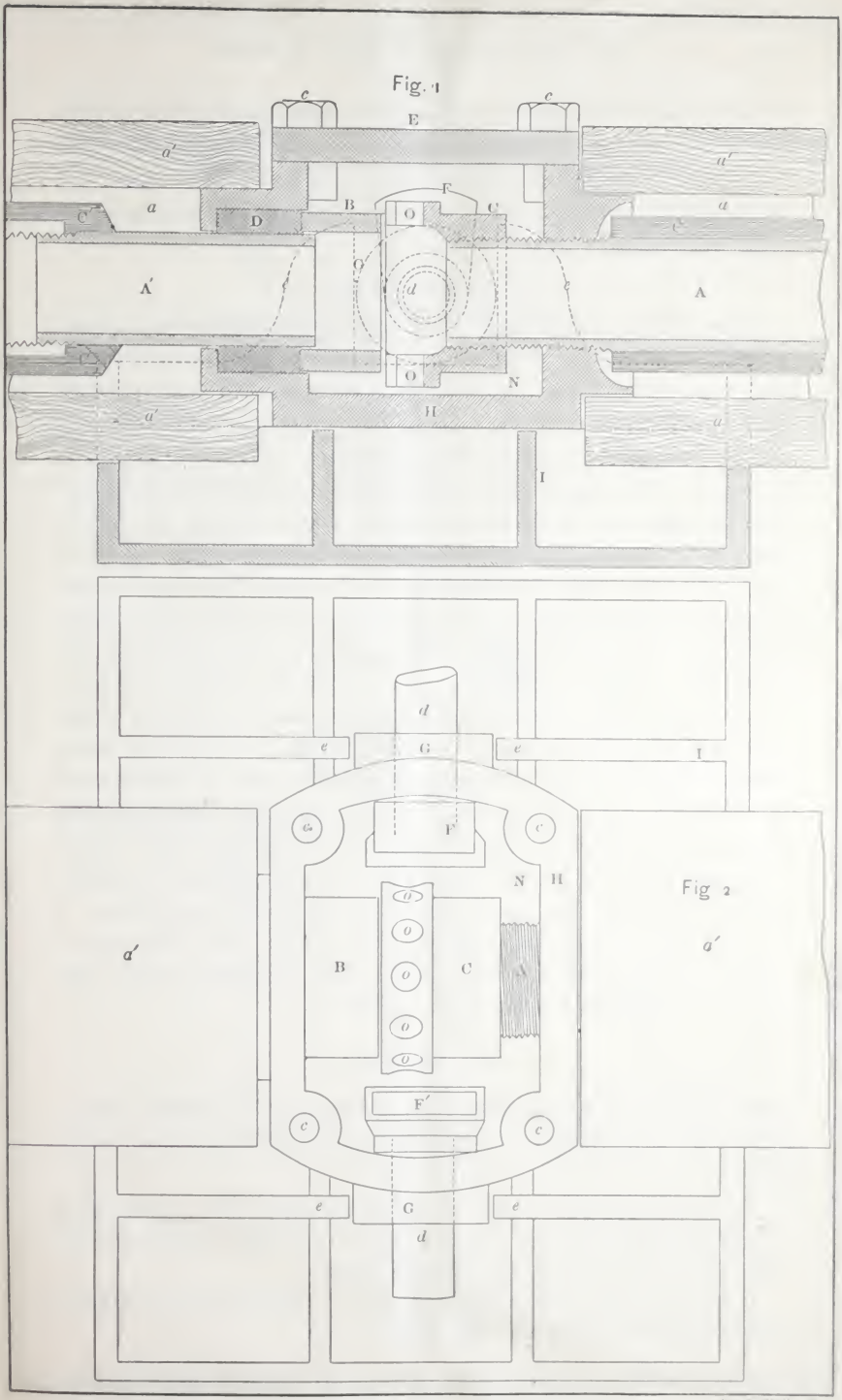


Fig. 1
c
E
c
a'
a'
a
C
D
B
F
O
C
a
c
A'
d
A
O
N
H
a'
a
I
d
e
G
e
I
c
F
c
N
H
Fig 2
a'
B
C
a'
F'
c
c
e
G
e
d

PLATE NO. 4.

from the boiler there will be precisely the same result as in a building only a few feet away. The consumer living near the boiler-house will have no advantage over the consumer living a mile away, since each will ordinarily carry the same house pressure—which is steam at the same temperature.

STEAM FIRE ENGINES.

These will be greatly simplified in construction, and the cost reduced one-half or more, as the boiler and furnace will be entirely dispensed with. On the streets of cities and villages having a reservoir system, steam will be taken from the main to the curbstone, where a pipe will come to the surface beside the street hydrant. *(See cut, last page, on the cover.)* The engine will be comparatively cheap and portable, and after the alarm, will arrive promptly on the ground without the frightful noise and confusion attending the ordinary steam fire-engine. It will at once take power from the steam pipe, and suction from the hydrant. The power will be always up, and by having the steam pipe impinge against the base of the hydrant, freezing will be prevented in the coldest weather. While it will not, perhaps, reduce the number of firemen, it will increase their efficiency and greatly diminish the cost and current expenses of the fire system. The effectiveness of steam itself as an element applied directly to the entinguishment of fires, is well known in the oil regions. In burning buildings the fire often rages under the floors between the joists, where it cannot be reached by water. Steam being lighter than air, when poured into such a building in sufficient quantity, rises and fills these spaces, thus preventing combustion. A two-inch pipe, at 60 pounds pressure, will deliver 5,000 cubic feet of steam per minute, which would make a body of steam two feet deep below the ceiling, in a room 25 by 100 feet.

ICE AND SNOW

can easily and cheaply be removed from streets and sidewalks, where in large cities it is frequently a serious obstacle to ordinary locomotion and traffic.

A receptacle one by six feet, near the curbstone, with a steam coil at the bottom, will melt the snow as fast as delivered therein, and the water will be conveyed to the adjacent sewer.

Experiments show that the cost in fuel of melting a ton of snow in this manner will not exceed five cents.

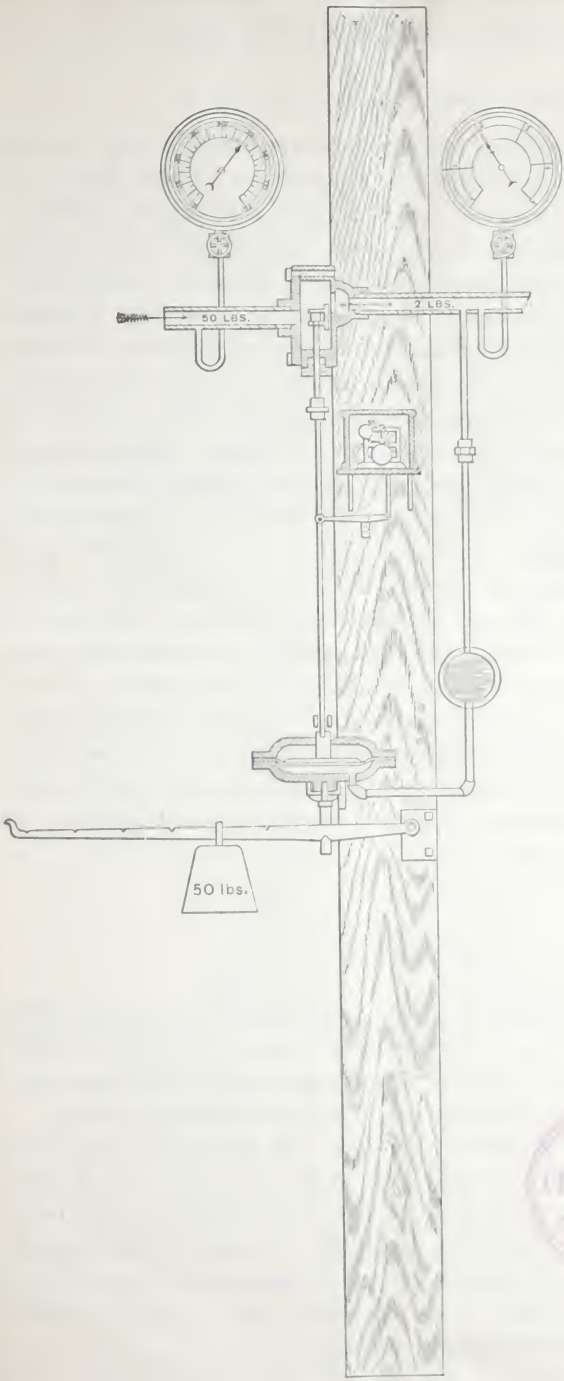


PLATE NO. 5.

STEAM COOKING AND LAUNDRY WORK.

In many large hotels the greater part of the cooking is done by steam and gas, but the apparatus is too expensive to go into general use. The stove shown at *figure* 6, may be made of sheet copper, galvanized iron or tin, and costs from five to twelve dollars. The center opening nine inches, and those around the outside six inches, making seven openings in all. The central steamer may be quite long, extending downward, with compartments, so as to cook several kinds of vegetables at the same time. The small receptacles are for cooking oysters, custard, tea, coffee, puddings, etc., all at the same time. All this can be done more quickly and better than by a wood or a coal stove, and without danger of burning, and avoiding extreme heat in the room during warm weather. The steam made with one pound of coal will cook the above-named articles in less time than it would take to start a good coal fire. The steam can be taken from the air valve of the radiator in the dining-room, through a small rubber hose, into the bottom of the central column of the stove. It can also be removed to any room of the house, in which there is a radiator, and there used. It is not claimed, however, that we have at present a complete and perfect steam stove, for every branch of cookery. But beyond a doubt it will all be accomplished within a few months—and with the aid of gas for cooking one or two articles—a beefsteak, for example—we could now say good-bye to stoves and coal.

SAFETY.

When this is done, all fires will be banished from buildings, and conflagrations averted except from external causes, which will be largely removed when whole blocks or districts are supplied with steam apparatus. The rates of insurance should be correspondingly lessened.

By an ingenious invention of Mr. Holly—the anti-thunder box—steam may also be discharged *directly*, yet without noise, into water for laundry purposes, or in bath tubs, and in a very few minutes it can be raised to the boiling point, thus doing away with the system of hot water circulation in houses. A room for drying clothes may also be cheaply arranged, a coil of pipe on the floor, with racks to slide in over the same, will do the drying very expeditiously.

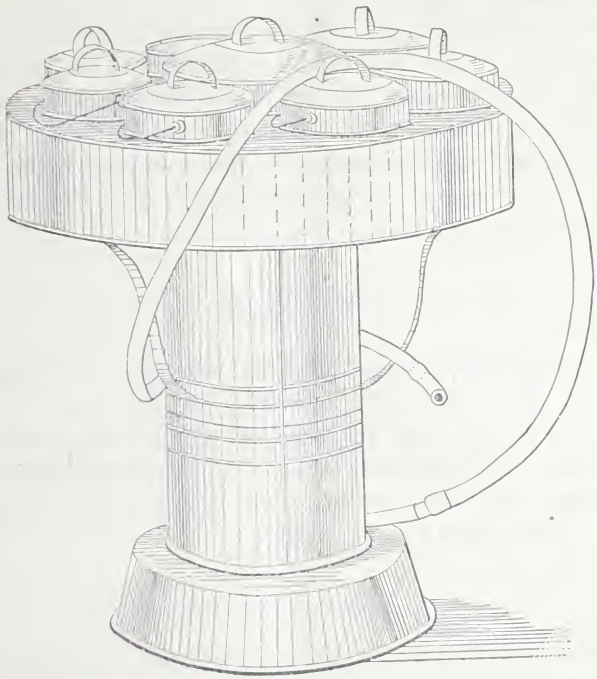


PLATE NO. 6.

GREENHOUSES AND CONSERVATORIES.

In addition to the services mentioned above, with steam under this system, we also heat greenhouses and conservatories, either by the steam direct, or by the circulation of the water of condensation. By an ingenious contrivance of Mr. Holly, water can also be carried to all the rooms in a dwelling, either by atmospheric pressure, or by the application of the direct force of steam for that purpose, *(see plate No. 7,)* without pump or engine.

The accumulator shown at *K*, is a thin cast-iron pipe 8 or 10 inches in diameter, capped at both ends, placed upright in kitchen, bath-room or where wanted—with a half inch pipe leading from the tank in the cellar, into the bottom of the Accumulator, provided with a check valve at the tank-end. Also a three-eighths inch steam pipe leading from the cellar into the top of the Accumulator, shown at *R*, the water for use being drawn from the bottom, through valve *c*.

OPERATION.

On opening valves *o* and *c*, the steam will enter at the top and drive the air out at *c*. Then close both valves, and the steam will condense and form a vacuum. when the space will be filled with water from the tank below. It is then ready for use. If a quantity of water is drawn by opening both valves, the space will soon be filled by closing both valves. If the water is to be stored in a

TANK IN THE ATTIC,

the three-eighths inch steam pipe described above should be attached above the regulating valve, where it will get the full pressure of the street mains. Then with a half inch pipe, with check valve leading from the bottom of the Accumulator to the tank in the attic, we have only to fill the Accumulator as before described, then open the steam valve *o*, which will produce a pressure of 30 to 50 pounds to the inch, on the water in the Accumulator, and elevate it to the tank above, even 60 or 80 feet high. The water in the tank can be kept hot if desired, by leaving valve *o* open after the water is out of the Accumulator, the steam passing through the water-pipe into that noiseless box before mentioned, which may be placed inside the tank.

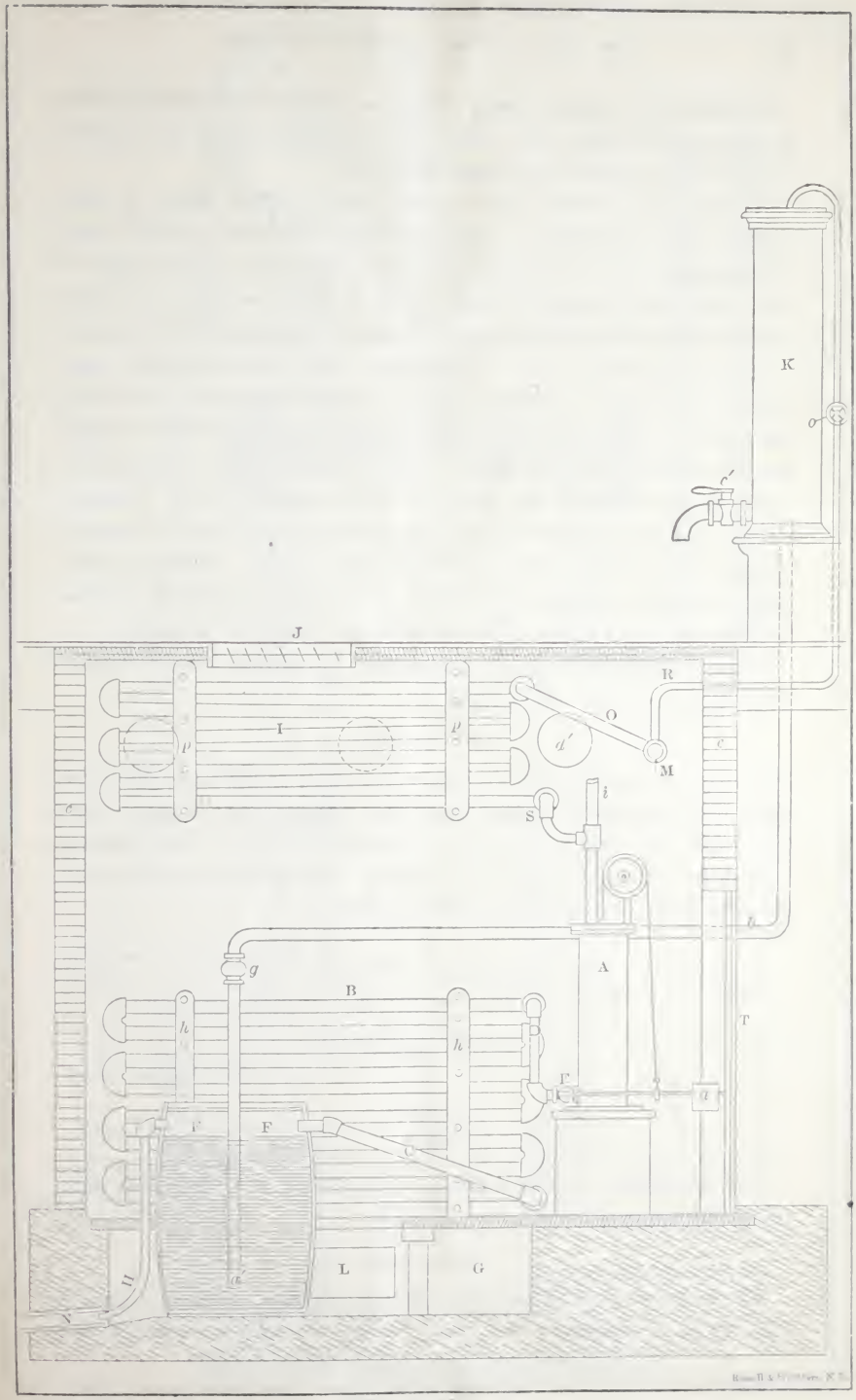


PLATE NO. 7

Machinery for a great variety of light mechanical and manufacturing purposes, which exists in all cities, will be operated, and the exhaust steam used for heating in the same building.

We have thus detailed some of the uses to which steam is being applied, under this system. Steam heating is not new, as many large establishments have for years been warmed through a great length of pipe. But the supplying of steam *to the public, by measure, at a price*, and its delivery through mains and laterals of iron pipe laid in the public streets, is entirely novel. Others may have entertained the vague *idea* that districts of dwellings could be supplied with steam for heating and power, but they never yet have invented the instruments or appliances by which it could be done. Without certain vital parts and combinations, the system of Mr. Holly would be imaginary only. Through his skill and genius he has invented these indispensable links to a perfect working plan, and they are secured by letters patent. Without undertaking to detail or describe all of the various devices employed, we have briefly stated a few of the obstacles which are overcome by them.

The popular belief is that steam cannot be carried a long distance effectively on account of its rapid

CONDENSATION.

But accurate experiments through a mile and a third of continuous small pipe, properly protected, show that the per cent. of loss is very small, and that this is, in fact, no hindrance whatever. The following table shows the size of districts that may be economically heated through the different sizes of pipe under this system:

Size of Pipe in inches.	Capacity per 1600 feet in lbs. of coal per hour.	Distance in feet from boiler that steam can be economically furnished.
1½	66	1,000
3	400	3,000
6	2,400	9,000
12	14,400	18,000

Condensation in a six inch pipe is double that of a three inch pipe, but it will deliver six times as much steam.

STEAM TRAP.

The hot water, with a portion of steam from the radiators, passes to the trap in the basement, *(see plate No. 8,)* where it is separated, and

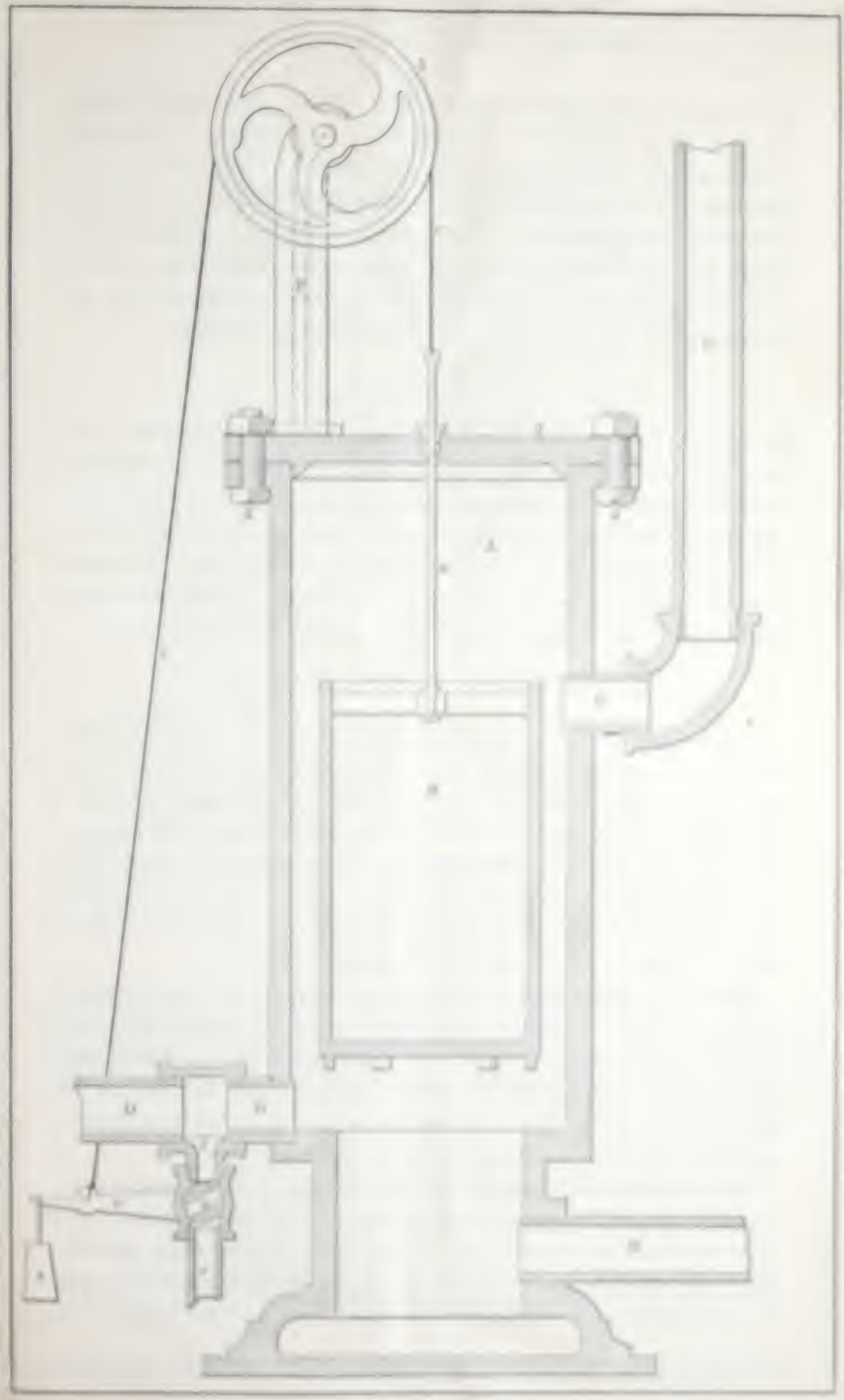


PLATE No. 8.

is circulated through coils of pipe within a brick inclosure. Through this box, air is passed from the outside of the building, and through a register, usually in the floor of the hall above. This extracts all the heat from the water, and produces adequate ventilation, and a delightful summer-like atmosphere. The water from the coil is discharged into a tank, and the overflow goes to the sewer. The water thus stored is very desirable for all household purposes, it being chemically pure, and is raised to the Accumulator above, as heretofore described.

A STEAM METER

has been invented by Mr. Holly, *(see plate No. 9,)* which records accurately the amount of steam used by each consumer. The record is made by a pencil on a ribbon of paper which is moved by clock work. The pencil denotes the quantity of steam used, and the time of day at which each radiator in the house was put on or taken off. Thus each consumer pays for what he uses, and for no more. In this way, equitable dealing is maintained between the company and its consumers.

CONVENIENCE, NEATNESS, HEALTH.

The expense of gas is several times that of kerosene, yet it is extensively used in preference, because always at hand, safer and better. Since steam can be supplied in the same way, by simply opening a valve, and at no increase of expense, why should it not come into general use? There will be no storage of coal or removal of ashes. The dust which gives the careful housekeeper so much annoyance by settling upon carpets and furniture and the decorations of walls and ceilings, is banished, and much labor saved and damage prevented.

This dust, together with more or less gas escaping and being breathed by those who are necessarily confined much of the time within doors, is the cause of many throat difficulties and headaches, to which some persons are subject during the winter season. Steam heat, in connection with our indirect system of ventilation, proves in actual experience a perfect remedy for these difficulties in numerous cases.

Why do people so frequently take cold at home, with no special exposure, and why is the current and popular belief that "we take cold more readily in the house than in the open air," so often verified? Simply in consequence of vitiated or impure air, from want of ventilation, and the escape of deleterious gases, dust, and the smoke from

Fig. 1

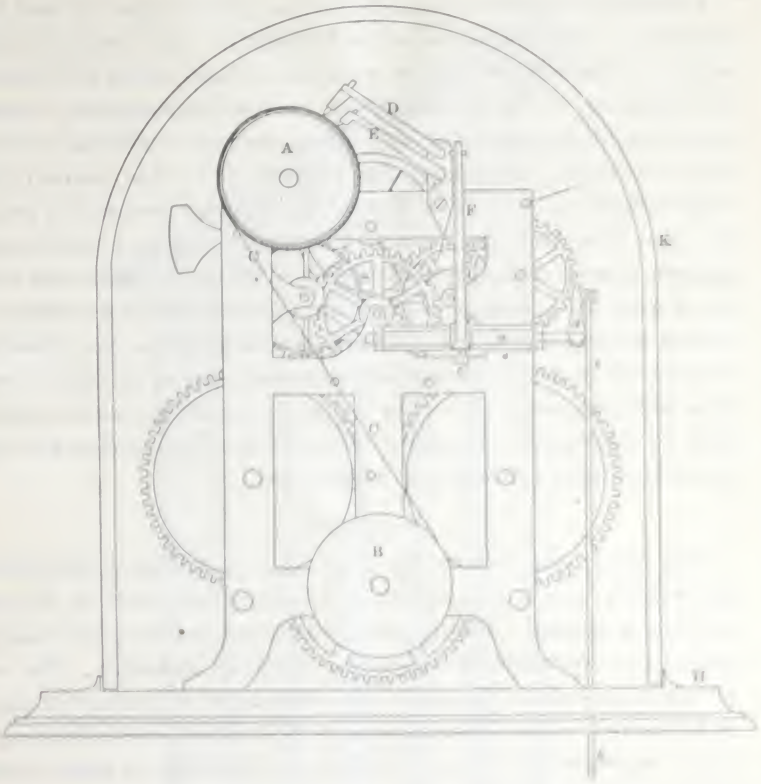


Fig. 2

PLATE No. 9.

stoves and furnaces; and also from falling and frequently changing temperature.

Uniformity of temperature, as well as a proper degree of heat and moisture, is essential to comfort and health, not only during the day, while the head and hands are at work, but as much during the hours of rest and sleep. It is a mistake that "a cold sleeping-room is better than a comfortably warm room." While thorough ventilation is necessary in a sleeping apartment, it is not true, as is often claimed, that "there should be no artificial heat." But on the contrary, it is one of the most important of all health questions to secure a uniform and properly warmed atmosphere to sleep in. When the mind and body are at work, the system is much better fortified against the effects of change of temperature, the inhalation of noxious gases, etc.; therefore we must see to it that our sleeping apartments, first of all, shall be supplied with pure, warm air. How to best accomplish this seems evident, since no other system of heating is absolutely free from dust, gas, and the sudden rising and falling of temperature.

RADIATORS.

This system admits of the use of all kinds of Radiators, both direct and indirect, and is a combination as already described, of the two methods of heating. We are using, with entire approval, the radiator made by the Walworth Manufacturing Company, of Boston. The size of radiator, of course, should be proportioned to the amount of space to be warmed, in the different rooms of the building, and to their exposure. As, when live steam is delivered to a building, no matter where made, perfect service is merely a question of fixtures.

ATMOSPHERIC RADIATORS.

Mr. Holly's new radiator *(see plates* 10 *and* 11*)* is so named for the reason that the pressure is always the same as the pressure of the atmosphere. It is made of thin sheet copper, galvanized iron, or other durable sheet metals. Upright tubes, three or four inches in diameter, are connected with a horizontal cap and base of the same or a different material, with openings in the base to allow the air to pass freely in and out. Thus a little steam brought into the cap will occupy the upper portions of all the tubes, and the inlet valve will be set according to the amount of heat desired in the room. Steam being lighter than air can be made to occupy any part or the whole of the radiator, and in

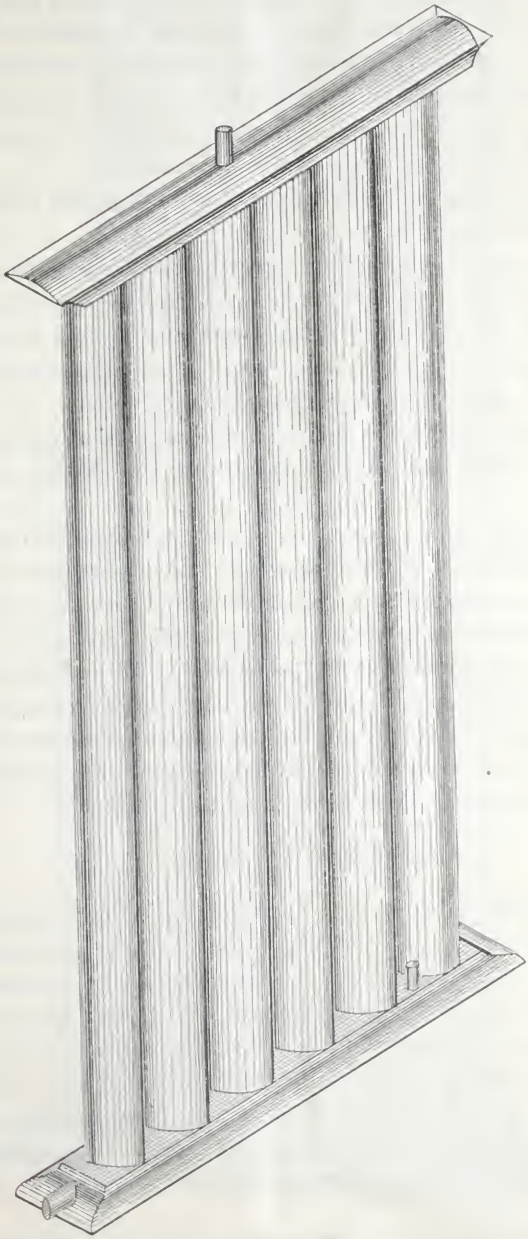


PLATE NO. 10.

no case can there be more than atmospheric pressure. The adjustment of the inlet valve for any given amount of heat can be depended upon, inasmuch as the pressure of steam in the building is kept uniform by the regulator before described. Thus it will be seen that the temperature of the room may be raised one degree or eighty degrees, as required, and maintained until the inlet valve is again changed.

Advantages of the Atmospheric Radiator: *First*—It can be made and put up for about half the cost of other radiators.

Second—The same surface will give off more heat than a heavy cast iron or wrought iron radiator.

Third—A very small portion or a large portion of its surface may be made hot, while the remainder will be cold; and the water of condensation will give off all its heat and go directly to the tank in the cellar, at a low temperature. There being no valve or back pressure in the return pipe, no water can ever accumulate in the radiator.

There being no pressure in the outlet pipe after the steam has passed the valve, no water can escape to soil the carpet. No air valves are required.

Fourth—Condensation in the pipes in the basement and about the building is reduced to about one-third of the amount due to the old system, for the reason that a one-fourth inch steam pipe will supply radiators to warm 6000 cubic feet of space, while it requires a three-fourths inch pipe to warm 3000 cubic feet by the ordinary method. The return pipe being cold, there is no condensation, consequently no covering is required. As no trap is necessary in connection with this radiator, it will be very desirable in many places, such as shops and offices, and in houses where there is no basement.

ECONOMY OF THE SYSTEM.

The tests made during the winter establish this beyond question, viz: That the same amount of heat can be supplied at a good profit for what the coal and wood bills of consumers would be for stoves and furnaces, and the quality infinitely superior. And at the same time the loss on stoves, stove-pipes and furnaces by deterioration is saved. Any one, by a little reflection and examination in a general way, will understand the saving effected, inasmuch as it is well understood that, as a rule, the coal bill is about half of the total expense of an apparatus—estimating the ordinary depreciation and repairs upon fixtures, the cost

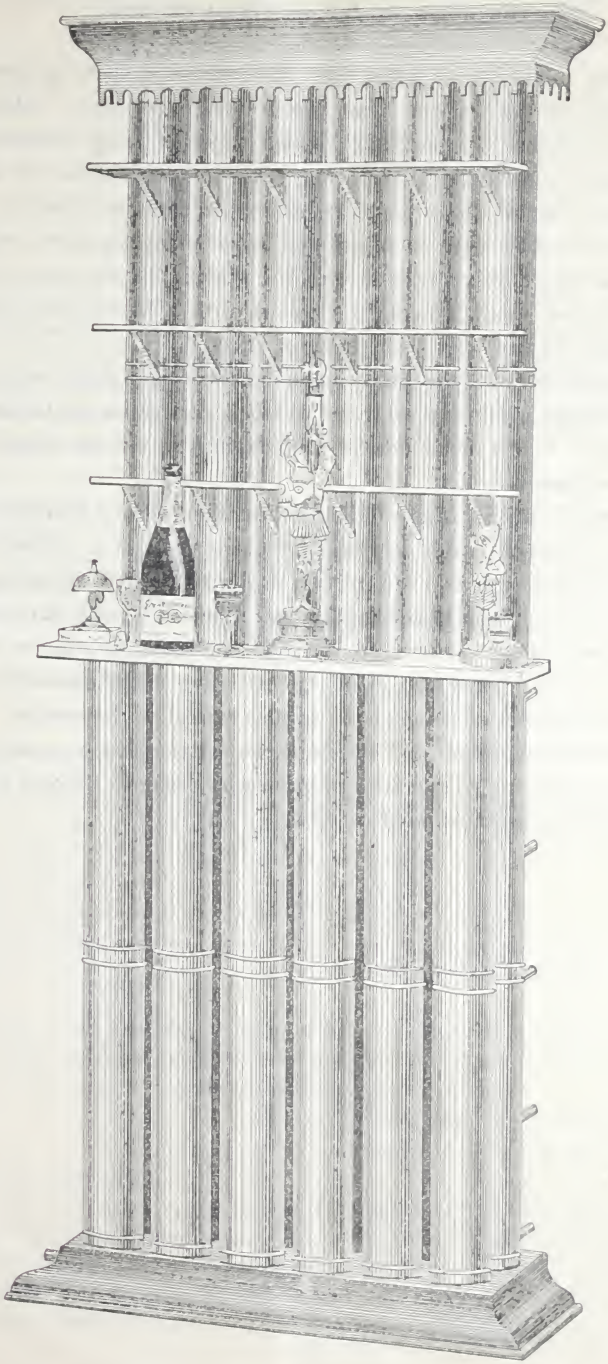


PLATE NO. II.

of stoking, removing of ashes, etc. It is admitted that, by other systems, sixty per cent. of the heat goes up the smoke pipe. Under this system this waste is practically stopped, the loss being confined to a single stack at the boilers, which may serve to supply steam for several hundreds or thousands of buildings, while the care and labor of a single boiler establishment is substituted for as many separate establishments as may have connection with the works. By the use of cheap fuel, coal dust, or slack under the boilers, with a blower, it is at once seen that a further large saving may be effected.

It is expected that the Holly system of heating will be very extensively adopted within a short time, as stock companies are forming for the purpose in the Dominion of Canada, and in various cities in this and other States.

We are able to give other valuable information to those who would like to take an interest in this new and promising invention, and we invite all interested parties who can, to visit us during the present spring, and witness the work we are accomplishing. While the public have a general interest in the success of this new enterprise, it can be shown beyond a doubt that it also opens an extensive and remunerative field for the investment of some of the surplus capital of the country.

From the incredulous and criticising, we ask the closest examination, while we invite the co-operation of those who desire to become directly interested in a business point of view.

TESTIMONIALS.

LOCKPORT, N. Y., March 23, 1878.

To whom it may concern.

The Holly Steam Heating Company are now, and have been for months past, heating many private dwellings in this city, with, I believe, perfect satisfaction to their customers. They are also heating one of our largest public school buildings, and members of the Board of Education inform me that it is better heated than any other of the public buildings.

There are other features of this system besides the heating of buildings, to which it may be well to call your attention. At a very slight expense, comparatively, the fire hydrants of a city can be kept from freezing. The heavy steam engines now in use for fire purposes can be replaced by engines without boilers and furnaces, which may take steam from the street pipes at the hydrants, and being so much lighter, will certainly add to the usefulness of the fire department, and reduce materially the expense of its maintenance. Taken as a whole, I consider the invention one of the most valuable of the age, and rejoice that our city is provided with it.

H. D. MCNEIL, *Mayor.*

LOCKPORT, N. Y., March 25, 1878.

To whom it may concern.

The system of conveying steam in pipes laid below the surface of the streets in this city, for heating and motive power, introduced by the "Holly Steam Combination Company" during the past year, has been under my observation while in construction and subsequent use, up to the present time.

So far no serious inconvenience to the public in the use of the streets has been occasioned while in process of construction. And since completion I am satisfied no damage or injury can result any more than would be the case with gas or water pipes.

As far as I am informed, all users of the steam are entirely satisfied, and their expectations more than realized, in the abundant supply of heat, with the perfect control of the same, as well as with the amount it costs.

S. F. GOODING, *City Surveyor.*

LOCKPORT, N. Y., March 25, 1878.

To whom it may concern.

I hereby state, for the encouragement of citizens, companies and corporations who contemplate adopting the heating system of the Holly Steam Combination Co., of Lockport, that the manner of laying street mains by this company does not materially interfere with the affairs of a public street, and when the work is completed the streets are in their former good condition.

JOHN W. BEEK, *Supt. of Streets.*

SURVEYOR'S OFFICE, LOCKPORT, N. Y., March 25, 1878.

I regard the manner of laying street mains and laterals adopted by the Holly Steam Combination Company, of Lockport, of advantage to the streets in which they are laid, for the reason of their drainage. All pipes are laid on a grade over drain tile, and with frequent connections with the sewer,—thus securing a dry condition of the earth at all times. JULIUS FREHSEE, *C. E. and Surveyor.*

LOCKPORT, N. Y., March 25, 1878.

To whom it may concern.

My dwelling house, No. 119 Genesee street, in this city, has been heated the past Winter by steam, furnished by the Holly Steam Combination Company, of Lockport, through their system of street mains. The heat thus furnished is very pleasant, and I consider this system a perfect success. A. HOLMES, *Ex-County Judge.*

LOCKPORT, N. Y., March 26, 1878.

To whom it may concern.

I hereby state that I have had power from the Holly Steam Company's street mains for running my engine, with which I run a 28 inch buzz saw, and an axe for working cord wood into stove wood, and at all times have ample power for the work.
DANIEL K. HUMPHREY, *Locust St. Wood Yard.*

LOCKPORT, N. Y., March 25, 1878.

To whom it may concern.

I take pleasure in stating that the Holly Steam Combination Co. has supplied steam for my 10-horse power engine, and for heating my entire building during the past winter. The power is prompt and efficient, which demonstrates beyond a question the success of the system. I prize the system very highly, on account of its safety from fire. My bakery and residence are nearly half a mile from the boiler-house. JOHN NOBLE, 69 Market Street.

LOCKPORT, N. Y., March 26, 1878.

To all parties interested.

Having used steam to heat my residence, corner of Walnut and Pine streets, during the past Winter, delivered by the Holly Steam Combination Company, through its system of street mains, I take pleasure in saying that the service has been performed in the most satisfactory manner.

The same Company, in addition to heating a large number of private residences, and running two engines, one of them half a mile away from the boiler-house, are also heating one of the largest public school buildings of the city.

In my official capacity, I have given the subject critical attention, and can but say that this building has been more perfectly warmed and ventilated than ever before.

On the score of comfort, health, convenience, and economy, I regard Mr. Holly's System, as in practice here, superior to all other plans or contrivances for heating residences and other buildings in cities and villages.

JAMES JACKSON, JR., *President Board of Education.*

LOCKPORT, N. Y., March 25, 1878.

To whom it may concern.

We, the undersigned, patrons of the Holly Steam Combination Co. of Lockport, take pleasure in stating that our several residences have been thoroughly and pleasantly warmed during the past winter, by the system of under-ground steam mains and laterals invented by Birdsill Holly, and that for reasons of cleanliness, uniformity of temperature, thereby securing health and comfort, and also for convenience and economy ; we recommend this heating system to all who can avail themselves of its use.

O. C. WRIGHT, 26 Cottage St.
GEO. H. ELLIOTT, 182 Genesee Street.
JAMES JACKSON, JR., cor. Pine and Walnut Sts.
E. SIMMONS, 146 Walnut Street.
E. JAKEWAY, 34 Chestnut Street.
M. H. WEBBER, 141 Pine Street.
S. S. DICKERSON, 148 Cottage Street.
N. O. ALLEN, cor Cottage and Walnut Streets.
B. D. HALL, 188 Genesee Street.
W. E. McCOMB, 135 Pine Street.
D. J. CLAPSATTLE, 253 Genesee Street.
M. D. CLAPSATTLE, 243 Genesee Stret.
J. OSGOOD, 91 Cottage Street.
SAM'L ROGERS, 28 Walnut Street.
WM. H. HURD, 111 Cottage Street.
B. F. GASKILL, Genesee Street.
WM. J. BLACKLEY, 126 Walnut Street.
E. W. SCOTT, 50 Pine Street.
L. F. BOWEN, cor. Genesee and Cottage Sts.,
G. W. BOWEN, 185 Pine St.
A. K. POTTER, High St.
MRS. M. TUFT, 99 Cottage St.
LEONARD EVERETT, 121 Cottage St.
E. P. HOLLY, 8 Waterman St.
F. L. WRIGHT, Cor. Locust and Walnut Sts.
FRANK W. BALLOU, 177 Pine St.
WM. W. TREVOR, Walnut St.
BIRDSILL HOLLY, 3 Chestnut St.
MRS. C. HOLMES, 115 Genesee St.
MRS. A. M. GLASS, 268 Genesee St.
JACOB KIFF, 26 South St.
S. D. HOOPER, 129 Walnut St.
P. B. AIKIN, 91 Locust St.
S. R. DANIELS, N. Y. C. Elevator Building.
D. F. BISHOP, 252 Genesee St.

The foregoing brief testimonials have been kindly furnished us by persons using steam supplied through our street mains, and we would refer to them with becoming pride as among our most honored citizens, who had the faith and the enterprise last September and October to risk the requisite amount of money in placing steam fixtures in their residences, and perhaps more than this, their reputation for sagacity, to assist us in proving by demonstration the grand scheme of our heating system.

We thank them for these expressions of confidence and regard, believing that they are also thankful for the first luxury of this new system of heat.

We are particularly gratified that *every one* of our consumers has been pleased to place himself on record here, and we most respectfully refer interested people to any one of the above named persons.

Respectfully,

D. F. Bishop, *President.*